REMARKS

Claims 54–106, 109 and 110 are presently pending in the application. Claims 54–76, 109, and 110 stand withdrawn from consideration, and no new claims have been added. Accordingly claims 77–106 are presently under examination and favorable consideration thereof is respectfully requested.

Applicant has amended the specification in several places to correct typographical errors.

Claim rejections under 35 U.S.C. 102

The Examiner has rejected claims 7–101, and 103–106 under 35 U.S.C. 102(b) as being anticipated by Shimamori (U.S. Patent No. 5,932,938).

The standard for an anticipation rejection under 35 U.S.C. §102 has been well established by the Court of Appeals for the Federal Circuit, and is set forth in M.P.E.P. § 2131, which provides that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. In addition, the identical invention must be shown in as complete detail as is contained in the claim. For a prior art reference to anticipate a claimed invention, every element of the claimed invention must be identically shown in a single reference, and these elements must be arranged as in the claim under review.

Applicant's claim 77 recites:

> 77. An apparatus for controlling an energy transfer device operable to draw electrical power from an energy converter operable to convert energy from a physical source into electrical energy, and supply said electrical energy to a load, the apparatus comprising:
>
> a load power sensor operable to measure power supplied to the load by the energy transfer device;

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a voltage sensor operable to measure a supply voltage of the energy converter; and

a processor, in communication with said voltage sensor, said load power sensor and the energy transfer device, said processor being configured to cause the energy transfer device to change the amount of power drawn from the energy converter when the supply voltage of the energy converter meets a criterion, said criterion and the change in the amount of power drawn from the energy converter being dependent upon a present amount of power being supplied to the load.

Shimamori fails to disclose a load power sensor operable to measure power supplied to a load, and also fails to disclose a processor configured to cause the energy transfer device to change the amount of power drawn from the energy converter when the supply voltage of the energy converter meets a criterion as recited in applicant's claim 77. Furthermore, Shimamori also fails to disclose that the criterion and the change in the amount of power drawn from the energy converter are dependent upon a present amount of power being supplied to the load, as recited in applicant's claim 77.

Shimamori discloses a switching power supply unit that maintains an output voltage at a desired level without monitoring the output voltage level. The switching power supply includes a voltage sensor (DET1) for detecting an input voltage from an externally connected input power supply 21, a current sensor (DET2) for detecting an output current to an external load 22, and a temperature sensor (DET3) for detecting an ambient temperature. Shimamori also discloses a table 48, stored in memory, which relates detected values of DET1, DET2 and DET3 to ON time values for switching a transistor Q1 to maintain the output voltage. The ON time values in the table 48 may be determined using the apparatus disclosed in Figures 3 and 4 of Shimamori,

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which includes an additional voltage sensor (DET4) for detecting the output voltage and an additional current sensor (DET5) for detecting a load current.

The Examiner states that "Shimamori (i.e., Figs. 1–5) shows a system for controlling an energy DC-DC transfer device (31) comprising a load power sensor (DET2, DET4,DET5) for measuring power supplied to the load."

Additional sensors DET4 and DET5 are only used for preparing the table 48 prior to operation as a switching power supply, and do not appear to be used in normal operation of the switching power supply. Nowhere does Shimamori disclose measuring or otherwise determining power supplied to the load, as recited in applicant's claim 77. Shimamori expressly states that controlling the output voltage to a load is achieved "without monitoring the output voltage." No load power sensor is disclosed and there is no disclosure of calculating load power from the output current and output voltage. Consequently, Shimamori fails to disclose a load power sensor, and/or measuring power supplied to a load, as recited in applicant's claim 77.

Since Shimamori fails to disclose a load power sensor, Shimamori also fails to disclose a processor . . . in communication with the load power sensor, as recited in applicant's claim 77.

The Examiner appears to indicate that the table in Fig. 2 of Shimamori discloses "causing the energy transfer device to change the amount of power drawn from the energy converter when the supply voltage of the energy converter meets a criterion." However, applicant respectfully submits this is not the case.

At Col. 5, lines 4–12, Shimamori discloses that when the input voltage changes from 11.9 V to 8.2 V, while the output current remains at 9.8 A, the ON time of the switching transistor is changed from 0.500 to 0.894, in accordance with values in the table 48. The ON time values in the table 48 are determined such that the output voltage is maintained at a desired level in response to any input voltage within a given range, output current and ambient temperature

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(Col. 4, lines 40–44). Since the output current is also unchanged, the power drawn from the input power supply 21 will also be substantially unchanged when the input voltage changes from 11.9 V to 8.2 V. Therefore, it appears that the switching power supply of Shimamori does not change the ON time of the switching transistors to change an amount of power drawn from the power supply 21, but rather changes the ON time of the switching transistors to maintain a constant output voltage and hence a constant power regardless of changes in input voltage. Shimamori appears to have sought a way of providing a constant power input for a range of input voltages. Consequently, Shimamori fails to disclose changing the amount of power drawn from the energy converter when the supply voltage of the energy converter meets a criterion, as recited in applicant's claim 77.

Shimamori also fails to disclose any input voltage criterion that is "dependent on a present amount of power being supplied to the load," as recited in applicant's claim 77. The input voltage values in the table shown in Figure 2 of Shimamori are fixed values with no dependency on the present amount of power being supplied to the load. Nowhere does Shimamori provide any disclosure of a criterion for input voltage to determine whether or not to change the amount of power drawn, where the criterion is dependent on a present amount of power supplied to the load, as recited in applicant's claim 77.

Shimamori also fails to disclose that the change in the amount of power drawn from the energy converter is dependent on the present power supplied to the load, as recited in applicant's claim 77.

Notwithstanding the above, as disclosed on page 3 of applicant's specification, changes in insolation can change the maximum power available from the array from 200 watts to 2000 watts in a matter of seconds, and unless the energy transfer device is configured to react quickly to this change, full available power is not being drawn from the array for a period of time, thus resulting

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in inefficient operation. The switching power supply of Shimamori appears to rely on a power source that is able to supply a rated power of the switching power supply, and thus to the switching power supply the source from which it receives power appears to be an infinite source able to supply whatever power is demanded of it. It appears that if the switching power supply disclosed by Shimamori were to be supplied from an energy converter, such as a solar array, the switching power supply would attempt to maintain a constant output voltage into the load and, in doing so would change the power drawn from the solar array in response to changes in insolation. For example, if such a system were to experience a change in insolation from 200 watts to 2000 watts, the switching power supply of Shimamori would compensate for any changes in input voltage due to the change in insolation by adjusting the ON times of the switching transistor to maintain a constant output voltage and output current to the load. Thus, the switching power supply disclosed by Shimamori would be unable to take advantage of the increased insolation. In contrast, when subjected to different insolation, applicant's energy transfer device would change the amount of power drawn from the energy converter, and the change in the amount of power drawn from the energy converter would be dependent upon a present amount of power being supplied to the load. Consequently, applicant submits that the Shimamori device would not perform the same function as applicant's claimed invention.

In view of the above, applicant submits that Shimamori fails to disclose:

> (1) "a load power sensor operable to measure power supplied to the load by the energy transfer device;"
>
> (2) or a "processor being configured to cause the energy transfer device to change the amount of power drawn from the energy converter when the supply voltage of the energy converter meets a criterion;" and

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(3) "said criterion and the change in the amount of power drawn from the energy converter being dependent upon a present amount of power being supplied to the load," as recited in applicant's claim 77.

Consequently, Shimamori fails to disclose every element of applicant's claim 77 and, therefore, the cited reference fails to satisfy the test for anticipation. Applicant therefore submits that claim 77 is not anticipated and the Examiner's rejection is improper and should be withdrawn.

Dependent claims stemming from claim 77 should be allowable due to their dependency and due to the additional subject matter these claims recite.

Applicant's claim 106 recites:

106. An apparatus for controlling an energy transfer device operable to draw electrical power from an energy converter operable to convert energy from a physical source into electrical energy, and supply said electrical energy to a load, the apparatus comprising:

means for measuring power supplied to the load by the energy transfer device;

means for measuring a supply voltage of the energy converter; and

means, in communication with said means for measuring power, said means for measuring voltage and the energy transfer device, for changing the amount of power drawn from the energy converter by the energy transfer device when a supply voltage of the energy converter meets a criterion, said criterion and a change in the amount of power drawn from the energy converter being dependent upon a present amount of power being supplied to the load.

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Claim 106 is an apparatus claim expressed in means plus function format and includes elements that generally correspond to elements recited in claim 77. For the same reasons set forth above in connection with claim 77, Shimamori fails to disclose every element of the applicant's claim 106, and, therefore, the cited reference fails to satisfy the test for anticipation. Consequently, applicant submits that claim 106 is not anticipated and, therefore, the Examiner's rejection of the claim is improper and should be withdrawn.

The Examiner has rejected claims 77–79, 90, 100, 101, and 103–106 under 35 U.S.C. 102(e) as being anticipated by Stamenic et al. (U.S. Patent No. 6,690,590).

Stamenic et al. fails to disclose a load power sensor operable to measure power supplied to the load by the energy transfer device and also fail to disclose a processor configured to cause the energy transfer device to change the amount of power drawn from the energy converter when the supply voltage of the energy converter meets a criterion, the criterion and the change in the amount of power drawn from the energy converter being dependent upon a present amount of power being supplied to the load, as recited in applicant's claim 77.

Stamenic et al. disclose a switched mode power supply (SMPS) for regulating delivery of power to a load from a DC power source (such as a solar array). Stamenic et al. disclose that the SMPS monitors signals from an output voltage sensor or an output current sensor and implements one of a voltage maximum power point tracking (MPPT) algorithm, a current MPPT algorithm, and a battery MPPT algorithm, for controlling the power drawn from the DC power source. Stamenic et al. disclose an input voltage sensor for monitoring an input voltage to the SMPS, but this is not used when operating the SMPS according to any of the MPPT algorithms. Stamenic et al. further disclose that pulse width modulated (PWM) waveforms are generated for controlling the on time of transistors in the SMPS. In all of the disclosed MPPT algorithms, the disclosed PWM waveform is perturbed by a fixed time "Δt" and then the response to this

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perturbation is observed. The voltage MPPT algorithm observes changes in output voltage, and the current and battery MPPT algorithms observe changes in output current.

The Examiner states that "Stamenic et al. (i.e. Figs. 1, 4–6) show a system for controlling an energy DC-DC transfer device (20) comprising a load power sensor (36) for measuring power supplied to the load."

Applicant submits that the Examiner has incorrectly identified the sensor 36 shown by Stamenic as a power sensor. The sensor 36 is not a power sensor, but rather a voltage sensor. Nowhere does Stamenic et al. provide any disclosure of measuring power supplied to the load. Stamenic et al. teach away from calculating power values, at Col. 1, lines 32–39 which provide that calculation of power values from current and voltage measurements is undesirable, because this adds to complexity, and instead disclose regulating power delivery from a DC power source to a load by measuring either output voltage or output current, but not both, to achieve MPPT. Consequently, Stamenic et al. fails to disclose a load power sensor, or any other measurement of power supplied to the load, as recited in applicant's claim 77.

Since Stamenic et al. fails to disclose a load power sensor, they also fail to disclose "a processor, in communication with . . . said load power sensor and the energy transfer device," as recited in applicant's claim 77.

The Examiner states that Stamenic et al. also disclose "causing the energy transfer device to change the amount of power drawn from the energy converter when the supply voltage of the energy converter meets a criterion." However, the Examiner has not indicated where this is disclosed in the Stamenic et al. reference.

At Col. 4 lines 30–41, Stamenic discloses that the input voltage sensor 24 is not used in the operation of the apparatus, and thus the input voltage appears to be recorded only for monitoring purposes, unrelated to the operation of the SMPS. Since Stamenic et al. fails to

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disclose using the input voltage for any purpose other than monitoring, they also fail to disclose changing the amount of power drawn from the energy converter when the supply voltage of the energy converter meets a criterion, as recited in applicant's claim 77.

Furthermore, since Stamenic et al. al fails to disclose any criterion for the supply voltage, they also fail to disclose a criterion that is dependent on a present amount of power being supplied to the load, as recited in applicant's claim 77.

Notwithstanding the above, the SMPS disclosed by Stamenic et al. uses a fixed perturbation of the switching time of the switching transistors (Col. 6, line 55), wherein the switching time is either increased or decreased by a fixed amount and then response to this perturbation is observed. Applicant draws the Examiner's attention to page 2 and 3 of applicant's specification where some of the problems related to fixed perturbation are disclosed. Specifically, if the SMPS disclosed by Stamenic et al. were used to supply power to an AC grid, the SMPS may be slow to respond to changes in insolation due to the use of a fixed perturbation. In contrast, applicant's energy transfer device is configured such that the change (perturbation) in the amount of power drawn from the energy converter is not fixed, but rather is dependent upon a present amount of power being supplied to the load, as recited in applicant's claim 77.

In view of the above, applicant submits that Stamenic et al. fails to disclose:

> (1) "a load power sensor operable to measure power supplied to the load by the energy transfer device," or
>
> (2) a processor "being configured to cause the energy transfer device to change the amount of power drawn from the energy converter when the supply voltage of the energy converter meets a criterion, said criterion and the change in the amount of power drawn from the energy converter being

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dependent upon a present amount of power being supplied to the load," as recited in applicant's claim in applicant's claim 77.

Consequently, Stamenic et al. fails to disclose every element of applicant's claim 77, and, therefore, the cited reference fails to satisfy the test for anticipation. Applicant therefore submits that claim 77 is not anticipated and the Examiner's rejection is improper and should be withdrawn.

Dependent claims stemming from claim 77 should be allowable due to their dependency and due to the additional subject matter these claims recite.

Claim rejection under 35 U.S.C. 103

The Examiner has rejected claim 102 under 35 U.S.C. 103(a) as being unpatentable over Shimamori in view of Fletcher et al. (U.S. Patent No. 3,795,858).

The requirements for a *prima facie* case of obviousness have been well established by the Court of Appeals for the Federal Circuit, and are concisely summarized in M.P.E.P. § 2142 and 2143, which confirm that three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

Claim 102 is ultimately dependent on claim 77. Neither Shimamori nor Fletcher et al. disclose or suggest a load power sensor operable to measure power supplied to a load, or a processor configured to cause the energy transfer device to change the amount of power drawn

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from the energy converter when the supply voltage of the energy converter meets a criterion, as recited in applicant's claim 77.

Fletcher et al. disclose failure detection circuitry for indicating the failure of an inverter circuit based on its input and output voltages and/or its input and output currents.

Fletcher et al. fails to disclose or suggest anything that relates to measuring power supplied to a load or changing the amount of power drawn from an energy converter as recited in applicant's claims 77 or 102. Therefore, the cited references taken alone or in combination fail to disclose or suggest all elements of applicant's claim 102, and thus one of ordinary skill in the art would have no reasonable expectation of success in combining the references and would thus have no motivation to combine the cited references. Consequently, the references do not satisfy the test for obviousness and, therefore, applicant submits that claim 102 is not obvious and that the Examiner's rejection is improper and should be withdrawn.

Applicant respectfully requests further favorable consideration of the application.

The Examiner is invited to telephone the undersigned with any remaining issues regarding this matter.

Respectfully submitted,
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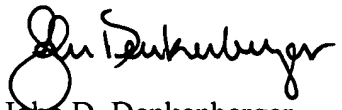

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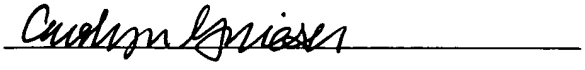
Date: February 7, 2006 

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